(PS15)

Origin of metal - insulator transition and pressure effect on $SmRu_4P_{12}$

M. Hedo[1], T. Nakano[1], T. Fujiwara[1], Y. Uwatoko[1], H. Sugawara[2] and H. Sato[3]

[1]Institute for Solid State Physics, University of Tokyo, Kashiwa, 277-8581
[2]Faculty of Integrated Arts and Sciences, Tokushima University, Tokushima 770-8502
[3]Graduate School of Science, Tokyo Metropolitan University, Hachioji, 192-0397

We have carried out electrical resistivity measurement under high pressure of Ce-based skutterudite compounds[1,2]. As for these, it found that semiconducting state became stable under the high pressure. There is a report that the metal-insulator transition (MIT) appears instead of antiferro-quadrupolor order in $PrFe_4P_{12}$ recently [3]. Do all of the skutterudite compounds become insulating under high pressure if it is so? However, Shiratani *et al.* shows that obviously semiconductive behavior after MIT for $PrRu_4P_{12}$ is evidently suppressed at around 8 GPa[4]. While it exhibits superconductivity above 12GPa[5]. It was cleared $SmRu_4P_{12}$ shows MIT at ambient pressure [6] as well as $PrRu_4P_{12}$ became metallic-conductivity in all the temperature ranges at 10GPa on our recent work (fig.1). Are those compounds of $SmRu_4P_{12}$ and $PrRu_4P_{12}$ expressed MIT by the same mechanism? There is a reported that strating a structure phase transition involved the MIT in the case of $PrRu_4P_{12}$ [7]. Thus we have performed low-temperature powder X-ray diffraction experiment on $SmRu_4P_{12}$. It was found out that there was no clear indications of structure phase transition before and after the MIT. It is shown that the origin of the MIT of these compounds are different. We must examine electrical structure in this system carefully to understand conducting features under high pressure.

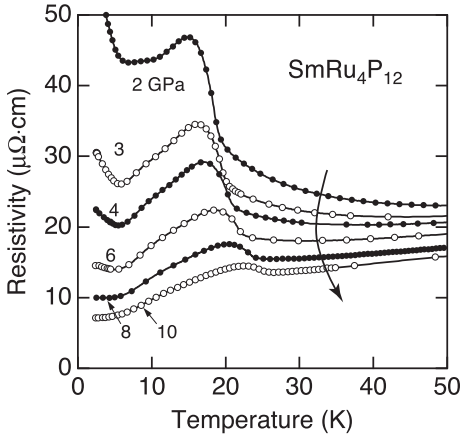

Figure 1: Temperature dependence of the electrical resistivity of $SmRu_4P_{12}$ under several constant pressures.

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